



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,794	02/11/2004	Weng Chang	TSM-476RI	4609
43859 7590 04/09/2008 SLATER & MATSIL, L.L.P. 17950 PRESTON ROAD, SUITE 1000 DALLAS, TX 75252			EXAMINER VU, DAVID	
			ART UNIT 2818	PAPER NUMBER
			MAIL DATE 04/09/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/777,794

**Applicant(s)**

CHANG ET AL.

**Examiner**

DAVID VU

**Art Unit**

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/5508)
- Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1-7, 9, 13-19, 21, 25 and 26 are rejected under 35 U. S. C. 102(b) as being anticipated by Jain et al. (US Pat. 5,686,356, hereinafter Jain).

Regarding claims 1-3, 5, 6, 9, 14, 15, 17, 18, 21 and 26, Jain discloses in figs. 3A-3D and 6 a method for forming a dielectric layer comprising: forming over the semiconductor substrate 20 a patterned conductor layer 22/24 (col. 7, lines 28-33); forming upon the patterned conductor layer 22/24, while employing a plasma enhanced chemical vapor deposition (PECVD), a silicon containing dielectric layer 30/32 (col. 7, lines 22-25), wherein when forming the silicon containing dielectric layer there is controlled a temperature of the substrate by use of a backside helium cooling gas pressure (col. 4, lines 27-43) so that there is enhanced a line-to-line capacitance uniformity of the patterned conductor layer. The PECVD process of Jain meet the structural and methodological limitations of this claim, thus they would (as an obvious consequence) also exhibit the same functional characteristics (i.e., enhanced a line-to-line capacitance uniformity of the patterned conductor layer). Moreover, "The claiming of a new use,

new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable.” *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). (MPEP 2112).

Regarding claims 4 and 16, Jain discloses the patterned conductor layer is formed to a thickness of 7500 angstroms (col. 5, lines 1-3).

Regarding claims 7 and 19, Jain discloses the silicon containing dielectric layer is formed to a thickness of 10000 angstroms (col. 5, lines 1-3).

Regarding claims 13 and 25, Jain discloses the PECVD silicon containing layer is achieved at a bias sputtering power of about 1600 watts (col. 4, lines 42-43).

2. Claims 1-3, 5, 6, 8, 9-15, 17, 18 and 20-26 are rejected under 35 U. S. C. 102(e) as being anticipated by Shufflebotham et al. (US Pat. 6,184,158, hereinafter Shufflebotham).

Regarding claims 1-3, 5, 6, 9, 14, 15, 17, 18, 21 and 26, Shufflebotham discloses in figs. 3A-3D a method for forming a dielectric layer comprising: forming over the semiconductor substrate a patterned conductor layer (col. 6, lines 13-16); forming upon the patterned conductor layer, while employing a plasma enhanced chemical vapor deposition (PECVD), a silicon containing dielectric layer (col. 9, lines 1-15), wherein when forming the silicon containing dielectric layer there is controlled a temperature of the substrate by use of a backside helium cooling gas pressure (col. 5, lines 26-31&54-59) so that there is enhanced a line-to-line capacitance uniformity of the patterned conductor layer. The PECVD process of Shufflebotham meet the structural and methodological limitations of this claim, thus they would (as an obvious consequence) also exhibit the same functional characteristics (i.e., enhanced a line-to-line

capacitance uniformity of the patterned conductor layer). Moreover, "The claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable." *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). (MPEP 2112).

Regarding claims 8, 10-12, 20 and 22-24, Shufflebotham discloses wherein the backside helium cooling gas pressure is from about 1-10 torr; the temperature of the substrate is from about -20 to 500°C (col. 5, lines 26-31).

Regarding claims 13 and 25, Shufflebotham discloses the PECVD silicon containing layer is achieved at a bias sputtering power of about 0-3000 watts (col. 5, lines 22-23).

3. Claims 1-7, 9, 11-19, 21, 23-29, 31, 33 and 34 are rejected under 35 U. S. C. 102(e) as being anticipated by Orczyk et al. (US Pat. 5,937,323, hereinafter Orczyk).

Regarding claims 1-3, 5, 6, 9, 14, 15, 17, 18, 21, 26-28 and 31, Orczyk discloses in figs. 5 and 6 a method for forming a dielectric layer comprising: forming over the semiconductor substrate 606 a patterned conductor metal lines 601; forming upon the patterned conductor layer, while employing a plasma enhanced chemical vapor deposition (PECVD), a FSG layer 604/605, wherein when forming the FSG layer there is controlled a temperature of the substrate by use of a backside helium cooling gas pressure (col. 14, lines 26-36) so that there is enhanced a line-to-line capacitance uniformity of the patterned conductor layer. The PECVD-FSG process of Orczyk meet the structural and methodological limitations of this claim, thus they would (as an obvious consequence) also exhibit the same functional characteristics (i.e., enhanced a line-to-line capacitance uniformity of the patterned conductor layer). Moreover, "The claiming of a new

use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable.” *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). (MPEP 2112).

Regarding claims 4 and 16, Orczyk discloses the patterned conductor layer is formed to a thickness of 8000 angstroms (col. 16, line 46).

Regarding claims 7 and 19, Orczyk discloses the silicon containing dielectric layer is formed to a thickness of 6000 angstroms (col. 16, lines 60-62).

Regarding claims 13, 25 and 34, Orczyk discloses the PECVD silicon containing layer is achieved at a bias sputtering power of about 1500 watts (col. 15, lines 26-28).

4. Claims 1-3, 5, 6, 8, 9, 11-15, 17, 18, 20, 21, 23-28, 30, 31, 33 and 34 are rejected under 35 U. S. C. 102(e) as being anticipated by Narwankar et al. (US Pat. 6,136,685, hereinafter Narwankar).

Regarding claims 1-3, 5, 6, 9, 14, 15, 17, 18, 21, 26-28, 30 and 31, Narwankar discloses in figs. 8&9 a method for forming a dielectric layer comprising: forming over the semiconductor substrate 100 a patterned conductor metal lines; forming upon the patterned conductor layer, while employing a plasma enhanced chemical vapor deposition (PECVD), a FSG layer 800, wherein when forming the FSG layer there is controlled a temperature of the substrate by use of a backside helium cooling gas pressure (col. 14, lines 31-46) so that there is enhanced a line-to-line capacitance uniformity of the patterned conductor layer. The PECVD-FSG process of Narwankar meet the structural and methodological limitations of this claim, thus they would (as an obvious consequence) also exhibit the same functional characteristics (i.e., enhanced a line-to-

line capacitance uniformity of the patterned conductor layer). Moreover, "The claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable." *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). (MPEP 2112).

Regarding claims 8, 10-12, 20, 22-24, 30 and 33, Narwankar discloses the temperature is controlled within a range of from about 0-500 degrees centigrade (col. 14, lines 31-34).

Regarding claims 13, 25 and 34, Narwankar discloses the PECVD silicon containing layer is achieved at a bias sputtering power of about 3350 watts (col. 15, TABLE 1).

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orczyk (US Pat. 5,937,323).

Orczyk discloses a method of forming a PECVD-FSG layer by the use of a backside helium cooling gas pressure higher than the chamber pressure (col. 14, lines 31-36) as describe above but fails to disclose the backside helium cooling gas pressure is from about 2-10 torr. Given the teaching of the references, it would have been obvious to determine the optimum pressure as well as condition of forming a PECVD-FSG layer involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation." Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 f.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

### **Conclusion**

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Vu whose telephone number is (571) 272-1798. The examiner can normally be reached on Monday-Friday from 8:00am to 5:00pm. If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Loke H can be reached on (571) 272-1657. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR, Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/DAVID VU/  
Primary Examiner, Art Unit 2818